

Flying corrosion inspection robot for corrosion monitoring of bridges

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Potential mapping permits early detection of corrosion and has major advantages over a purely visual condition assessment. The current manner of assessing the corrosion state of reinforced concrete structures with potential mapping is limited due to the lack of accessibility, leading to high involvement of manpower and finally to high inspection costs. A main challenge in the coming decades will be the assessment of our ageing infrastructure and their repair. Automating corrosion assessments of structures by an inspection robot will increase the use of non-destructive test methods and the quality of assessments and consequently lead to a more profound basis for the decision making and planning of the maintenance of the infrastructure and lower inspection costs. At ETH Zurich, the development of an omnidirectional flying inspection robot is currently being tackled as a collaborative effort between two research groups. The flying robot will collect the following data from the structure: (1) images of the surface, (2) potential of the steel and (3) electrical resistance between the sensor to the reinforcement. These measurements require the sensor to make physical contact with the concrete surface. As this contact task requires high stability and full 6 degree of freedom force and torque tracking to be robust in the field, no commercially available robot can be used for this task. First flight tests with the electrochemical sensor mounted on the inspection robot on an engineering structure demonstrate that potentials and resistances can be successfully measured, with results similar to measurements taken by hand.